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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the source device of spot light which irradiates with light selectively to two or more exposure mouths.

[0002]

[Description of the Prior Art]Conventionally, the source device of spot light is provided with the collection mirror which condenses the light emitted by the lamp, and it is constituted so that it may enter into the end of the fiber bundle in which the light condensed by this collection mirror was inserted by the fiber entry. This source device of spot light is provided with the shutter plate which interrupts that the light condensed by the collection mirror enters into the end of a fiber bundle, and is making the light which enters into the end of a fiber bundle turn on and off with this shutter plate. The device indicated to JP,5-22212,B also exists in the conventional source device of spot light.

[0003]

[Problem(s) to be Solved by the Invention]By the way, in the above-mentioned source device of spot light, in order to enter light in two or more fiber bundles selectively, it is possible to make it reflect the light condensed by the collection mirror towards the end of the fiber bundle selected with the reflector, but. In this case, it is necessary to make a power up rotate a reflector and to check the position of a reflector.

[0004]However, it was not desirable, when there would be a possibility that the light guide of the unnecessary light may be carried out to a fiber bundle and this source device of spot light would be used in a production line etc., if an electric discharge lamp was turned on while checking the position of a reflector.

[0005]The technical problem of this invention is that the light of an electric discharge lamp provides the source device of spot light which is not emitted superfluously.

[0006]

[Means for Solving the Problem] This invention the source device of spot light according to claim 1, An electric discharge lamp which emits light, and a cold mirror in which light which has an opening and was emitted from said electric discharge lamp is reflected, A reflector made to reflect light which was located in the opening side of said cold mirror, and was reflected by said cold mirror, A shielding member which has an optical emitting port to which light reflected by said reflector is made to emit, It has a rotational driving means which makes an optic axis of said electric discharge lamp rotate said reflector and said shielding member as a center, and a source device of spot light which irradiates with light reflected by said reflector selectively any of two or more exposure mouths they are via said optical emitting port of said shielding member is characterized by comprising the following:

A rotation-controls means to make said reflector and said shielding member rotate by said rotational driving means, and to position said optical emitting port of said shielding member in a position.

A radiation inhibiting means which forbids a light emission by said electric discharge lamp until positioning to said position of said optical emitting port is completed by said rotation-controls means.

[0007] According to this source device of spot light according to claim 1, until positioning to a position of an optical emitting port, for example, a home position, is completed by a rotation-controls means, Since a light emission by an electric discharge lamp is forbidden by a radiation inhibiting means, it can prevent that the light guide of the unnecessary light is carried out to a light guide etc.

[0008] Said shielding member of the source device of spot light according to claim 1 has cylindrical shape, and the source device of spot light according to claim 2 has said one optical emitting port.

[0009] According to this source device of spot light according to claim 2, since a shielding member has cylindrical shape, it can prevent being emitted from an exposure mouth which lights emitted from an electric discharge lamp are scattered about, and is not chosen.

[0010]

[Embodiment of the Invention] Hereafter, with reference to drawings, the source device of UV spot light concerning this embodiment of the invention is explained. Drawing 1 is an outline lineblock diagram of the source device 1 of UV spot light.

[0011] What is shown with the numerals 2 in a figure is a both-ends closure type electric discharge lamp which emits ultraviolet radiation. This electric discharge lamp 2 is arranged inside [which turned the opening rightward in drawing 1] the cold mirror 4, and the ultraviolet radiation emitted by the electric discharge lamp 2 by the inner surface of this cold mirror 4 is

reflected in the opening side.

[0012]What is shown with the numerals 6 in a figure is a cover drum which has the cylindrical shape which the end closed, and the one optical emitting port 8 to which the side attachment wall of this protection-from-light drum (shielding member) 6 is made to emit ultraviolet radiation is formed. This protection-from-light drum 6 is installed so that the opening side may be located in the electric discharge lamp 2 side, and inside the cylinder of the protection-from-light drum 6, the reflector 10 which has rectangle flat plate shape is arranged. One end of the reflector mounting shaft 12 is connected to the rear face of this reflector 10, and the other end of the reflector mounting shaft 12 is being fixed to the pars basilaris ossis occipitalis of the protection-from-light drum 6. This reflector 10 is arranged with the angle of 45 degrees to the optic axis of the electric discharge lamp 2, always turns to the optical emitting port 8 of 6 of a protection-from-light drum the ultraviolet radiation reflected by the cold mirror 4, and reflects.

[0013]The stepping motor 14 is formed in the right-hand side of the protection-from-light drum 6, and the reflector 10 and the protection-from-light drum 6 are rotated as one by this stepping motor 14. The position detecting plate 18 is connected to the driving shaft 16 of the stepping motor 14, and it has the position detection sensor 20 which detects the rotation of this position detecting plate 18.

[0014]The position detecting plate 18 is constituted by the disc-like member, and has a hole for detecting positions (not shown) in the position corresponding to the starting point 32 (refer to drawing 2 and drawing 3) in the hand of cut of the reflector 10. The position detection sensor 20 is constituted by the optical detection sensor, and it detects that the reflector 10 has turned to the direction of the starting point 32 in a hand of cut by detecting the light which passes through the hole for detecting positions of the position detecting plate 18.

[0015]The gobo 22 for preventing unnecessary ultraviolet radiation from shading ultraviolet radiation and leaking out of a device the above-mentioned electric discharge lamp 2 and around the cold mirror 4 is arranged. The electric discharge lamp 2, the cold mirror 4, the protection-from-light drum 6, the reflector 10, the stepping motor 14, the position detecting plate 18, and the position detection sensor 20 grade are accommodated in the inside of the housing 24. The side attachment wall of the housing 24 can be made to irradiate with ultraviolet radiation selectively from these two exposure mouths 26 and 28 by forming the two exposure mouths (fiber entry) 26 and 28, and rotating the reflector 10 (refer to drawing 2 and drawing 3).

[0016]As shown in drawing 2 and drawing 3 here, to the side attachment wall of the housing 24, the exposure mouths 26 and 28 incline and are provided. That is, the exposure mouths 26 and 28 are formed in the side attachment wall of the housing 24 so that the medial axis of these exposure mouths 26 and 28 and the optic axis of ultraviolet radiation reflected by the reflector 10 may be in agreement.

[0017]As shown in drawing 2 at these exposure mouths 26 and 28, one end 34a of the optical fiber bundle 34 is inserted, respectively, and the end 34a of the optical fiber bundle 34 is turned in the direction of the reflector 10. Although ultraviolet radiation with small light volume of a center section with large light volume of a periphery will enter into the end 34a of the optical fiber bundle 34 inserted in the exposure mouths 26 and 28 from the characteristic of the both-ends closure type electric discharge lamp 2, The thing which made each optical fiber in which the optical fiber bundle 34 constitutes the optical fiber bundle 34 between an incidence edge and an emitting end cross intricately is used so that uniform ultraviolet radiation may be emitted in an emitting end.

[0018]The left edge part [in the housing 24], i.e., outside surface of cold mirror 4, side is equipped with the cooling fan 30, and with this cooling fan 30. The air taken in from the air-intake provided near the stepping motor 14 the electric discharge lamp 2 of the housing 24 and near the cold mirror 4 is attracted. Therefore, cooling of the electrode of the electric discharge lamp 2 and cold mirror 4 grade is performed by discharging the air taken in from the air-intake out of the housing 24 through between the gobo 22 and the housing 24.

[0019]Drawing 4 is the Brock lineblock diagram of the source device 1 of UV spot light. The central processing unit (CPU) 40 controls the whole source device 1 of UV spot light, and the navigational panel 42, the memory 44, Motor Driver 46, and the lamp control power supply 48 are connected to CPU40.

[0020]The light volume switch 42c for setting up the light volume of the ultraviolet rays emitted from the lamp switch 42b and the exposure mouths 26 and 28 for making the navigational panel 42 turn on the electric power switch 42a for switching on a power supply to the source device 1 of UV spot light and the electric discharge lamp 2, etc. are formed. The preset value etc. of the light volume of the ultraviolet rays emitted from the exposure mouths 26 and 28 are memorized by the memory 44.

[0021]Setting out of the light volume of the ultraviolet rays emitted from the exposure mouths 26 and 28 is performed by operation of the light volume switch 42c of the navigational panel 42, etc. For example, in setting up make the ultraviolet radiation of 100% of light volume emit from the exposure mouth 26, and make the ultraviolet radiation of 50% of light volume emit from the exposure mouth 28, If operation of the light volume switch 42c performs 50% of specification to the exposure mouth 28 100% to the exposure mouth 26, In order to make the ultraviolet radiation of 100% of light volume emit from the exposure mouth 26 in CPU40. The rotation of the required stepping motor 14 is calculated, the rotation of the stepping motor 14 required in order to make the memory 44 memorize and to make the ultraviolet radiation of 50% of light volume emit from the exposure mouth 28 is calculated, and the memory 44 is made to memorize.

[0022]Motor Driver 46 is what controls the drive of the stepping motor 14, By turning on the

electric power switch 42a of the navigational panel 40, from the DC24V power supply 50 connected to the AC power (not shown), electric power is supplied to the stepping motor 14, and the drive of the stepping motor 14 is started. The lamp control power supply 48 controls supply of the electric power to the electric discharge lamp 2 based on the control signal from CPU40. The DC24V power supply 50 supplies electric power also to the cooling fan 30.

[0023]Next, operation of the source device 1 of UV spot light is explained. First, if the electric power switch 42a of the navigational panel 40 is turned on, Motor Driver 46 will start supply of electric power from the DC24V power supply 50 to the stepping motor 14. Processing for performing rotation of the reflector 10 and the protection-from-light drum 6, and checking the starting point 32 in the hand of cut of the reflector 10 by the drive of this stepping motor 14, is performed.

[0024]Namely, the stepping motor 14 performs rotation of the reflector 10 and the protection-from-light drum 6. After the position detection sensor 20 detects the hole for detecting positions of the position detecting plate 18, rotation of the reflector 10 by the stepping motor 14 and the protection-from-light drum 6 is stopped (with position after passing through the hole for detecting positions). Then, rotation of the reflector 10 by the stepping motor 14 and the protection-from-light drum 6 is stopped in the position which rotated one step of stepping motors 14 at a time, and detected the hole for detecting positions of the position detecting plate 18 with the position detection sensor 20.

[0025]Until the reflector 10 turns to the direction of the home position (starting point) 32 until the processing for checking the starting point 32 in the hand of cut of this reflector 10 is completed namely, Even if it is a case where the lamp switch 42b is operated by control of CPU40, it is made from the lamp control power supply 48 by not performing supply of electric power to the electric discharge lamp 2.

[0026]Therefore, if the lamp switch 42b of the navigational panel 42 is operated after the confirming processing of the starting point 32 in the hand of cut of the reflector 10 is completed, under control of the lamp control power supply 48, the electric power from the DC24V power supply 50 will be supplied to the electric discharge lamp 2, and the electric discharge lamp 2 will be turned on.

[0027]Next, in carrying out the light guide of the ultraviolet radiation to the end 34a of the optical fiber bundle 34 inserted in the exposure mouth 26. Based on the rotation of the stepping motor 14 memorized by the memory 44 by control of CPU40, the stepping motor 14 is rotated in the exposure mouth 26 direction, and the optical emitting port 8 of the protection-from-light drum 6 is coincided with the position of the exposure mouth 26 (refer to [drawing 2](#)). The light guide of the ultraviolet radiation reflected by the reflector 10 by this is carried out to the end 34a of the optical fiber bundle 34 inserted in the exposure mouth 26. At this time, since the end 34a of the optical fiber bundle 34 inserted in the exposure mouth 28 is shaded on the

protection-from-light drum 6, the light guide of the ultraviolet radiation is not carried out to the end 34a of this optical fiber bundle 34.

[0028]Next, when carrying out the light guide of the ultraviolet radiation to the end 34a of the optical fiber bundle 34 inserted in the exposure mouth 28, the protection-from-light drum 6 and the reflector 10 are rotated, and the position of the optical emitting port 8 of the protection-from-light drum 6 needs to be moved to the position of the exposure mouth 28. That is, based on the rotation of the stepping motor 14 memorized by the memory 44 by control of CPU40, the stepping motor 14 is rotated in the exposure mouth 28 direction, and the optical emitting port 8 of the protection-from-light drum 6 is coincided with the position of the exposure mouth 28 (refer to drawing 3).

[0029]In this drawing 3, the medial axis of the exposure mouth 28 and the optic axis of ultraviolet radiation reflected by the reflector 10 are shifted, and the state where the light volume of the ultraviolet radiation emitted from the exposure mouth 28 was extracted is shown. The light guide of the ultraviolet radiation reflected by the reflector 10 by rotation of this reflector 10 is carried out to the end 34a of the optical fiber bundle 34 inserted in the exposure mouth 28.

[0030]As the position of the optical emitting port 8 of the protection-from-light drum 6 moves to the exposure mouth 28, when it is located between the exposure mouth 26 and the exposure mouth 28, it will be in the state where all of the end 34a of the optical fiber bundle 34 inserted in the end 34a and the exposure mouth 28 of the optical fiber bundle 34 which were inserted in the exposure mouth 26 were shaded on the protection-from-light drum 6, and the light guide of the ultraviolet radiation will not be carried out to the end 34a of each optical fiber bundle 34.

[0031]Since according to the source device 1 of UV spot light of this embodiment it is controlled so that lighting of the electric discharge lamp 2 is not performed until the processing for checking the starting point 32 in the hand of cut of the reflector 10 is completed, it can prevent that the light guide of the unnecessary ultraviolet radiation is carried out to the optical fiber bundle 34, and the safety at the time of lighting of the electric discharge lamp 2 can be raised.

[0032]By rotating the protection-from-light drum 6 and the reflector 10 as one, the light guide of the ultraviolet radiation can be switched and carried out to the end 34a of the fiber bundle 34 inserted in the exposure mouth 26 or the exposure mouth 28, and the ultraviolet radiation emitted from the electric discharge lamp 2 can be used effectively. In the state where between the exposure mouth 26 and the exposure mouths 28 (i.e., the internal surface of the housing 24) was made to irradiate with ultraviolet radiation, all of the end 34a of the optical fiber bundle inserted in the exposure mouth 26 and the exposure mouth 28 will be in the state where it was covered on the protection-from-light drum 6, and can serve as a shutter mechanism on this protection-from-light drum 6.

[0033]Since the light volume of the ultraviolet rays emitted from the exposure mouths 26 and 28 can be set up according to the source device 1 of UV spot light concerning this embodiment, it also becomes possible to use the one source device 1 of UV spot light for hardening of two kinds of bonding resin, for example. That is, in two production lines, although bonding resin different, respectively may be used, in order to stiffen bonding resin in this case, the exposure of the ultraviolet radiation of light volume suitable for hardening of each bonding resin is needed.

[0034]Therefore, the source device 1 of UV spot light can be used for hardening of two kinds of bonding resin by setting the light volume of the ultraviolet rays emitted from the exposure mouths 26 and 28 as light volume suitable for hardening of each bonding resin. Also when using bonding resin which is different, respectively when pasting up two places of the product which flows through one production line, this source device 1 of UV spot light can be used.

[0035]Since the light volume of the electric discharge lamp 2 decreases temporally, it shifts the position of the end 34a of the optical fiber bundle 34 inserted in the optical emitting port 8 and the exposure mouths 26 and 28 of the protection-from-light drum 6, and carries out the light guide of the ultraviolet radiation at the beginning [of the electric discharge lamp 2] of discharge starting. The light guide of the ultraviolet radiation of fixed light volume can always be carried out to the fiber bundle 34 by shifting and lessening quantity with reduction of the light volume of the afterdischarge light 2.

[0036]In the source device 1 of UV spot light concerning this embodiment, In order to choose the fiber bundle 34 to which the light guide of the ultraviolet radiation is carried out by rotating the protection-from-light drum 6 and the reflector 10 with the stepping motor 14, The slack of the screw by vibration, etc. can be made hard to be able to decrease vibration and a shock, and to be able to make an operation sound small, and to produce.

[0037]It is also possible to resemble an above-mentioned embodiment and to use this electric discharge lamp that is not limited to this and emits lights other than ultraviolet radiation, such as visible light of a blue system, source device of UV spot light 1 although it sets and the electric discharge lamp which emits ultraviolet radiation is used as the electric discharge lamp 2. In this case, the use as a source device of spot light for bonding resin hardening can be diversified.

[0038]The thing concerning an above-mentioned embodiment for which it is not limited to the optical fiber bundle 34, and a fluid light guide is used source device of UV spot light 1 although it set and the optical fiber bundle 34 is inserted in the exposure mouths 26 and 28 as a light guide is also possible.

[0039]A fluid light guide is a light guide which filled the inside with the fluid here, and the refractive index of the fluid is constituted more highly than the refractive index of the solid surrounding this.

[0040]Since a fluid light guide does not have many cores and a clad like an optical fiber bundle, transmissivity can aim at effective use of synchrotron radiation well.

[0041]In the source device 1 of UV spot light concerning an above-mentioned embodiment, although shape of the protection-from-light drum 6 was made into cylindrical shape, not only this but the thing for which a tabular gobo is used is possible. In this case, a tabular gobo needs to be what has the width which can close simultaneously two or more exposure mouths (fiber entry) with which the outer wall of the housing of the source device of UV spot light was equipped. Thereby, the scattered light from the electric discharge lamp 2 and light leaking can be prevented from entering into the fiber bundle 34 superfluously.

[0042]It may be made to detect the life end of the electric discharge lamp 2 in an above-mentioned embodiment by installing an optical detection sensor in the internal surface of the housing 24 between the exposure mouth 26 and the exposure mouth 28. In this case, when the reflector 10 and the protection-from-light drum 6 rotate and the optical emitting port 8 reaches the position of an optical detection sensor, the strength of the ultraviolet radiation of the electric discharge lamp 2 is detected by an optical detection sensor. It is also possible to use for light volume regulation the strength of the ultraviolet radiation of the electric discharge lamp 2 detected with this photosensor.

[0043]In an above-mentioned embodiment, although two exposure mouths (fiber entry) are provided in the housing 24, it is also possible to provide three or more exposure mouths, without being limited to this.

[0044]

[Effect of the Invention]According to the invention according to claim 1, since the light emission by an electric discharge lamp is forbidden by a radiation inhibiting means until positioning to a position, for example, a home position, ends an optical emitting port by a rotation-controls means, it can prevent that the light guide of the unnecessary light is carried out to a light guide etc. Therefore, the handling nature and the safety at the time of electric discharge lamp lighting can be raised.

[0045]According to the invention according to claim 2, since a shielding member has cylindrical shape, it can prevent being emitted from the exposure mouth which the lights emitted from an electric discharge lamp are scattered about, and is not chosen.

[Translation done.]